PATENT ABSTRACTS OF JAPAN

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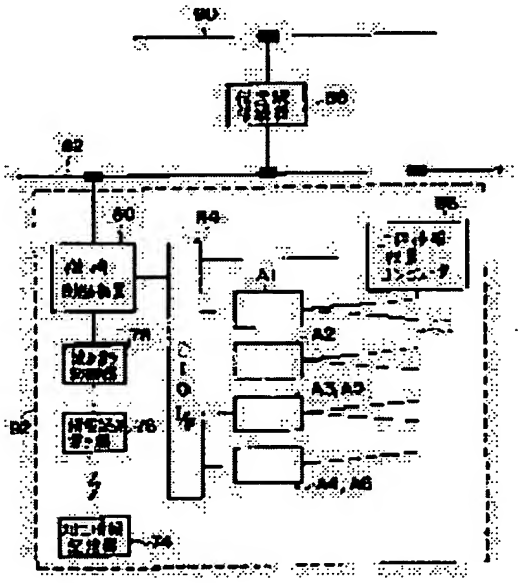
(54) METHOD AND DEVICE FOR MONITORING PRODUCTION PROCESS

(57)Abstract:

PURPOSE: To examine the cause of a defect and quickly cope with the defect when the defect occurs by displaying observed information at each observation point of a production process by reversely tracing the process from the abnormality discovering time when abnormality is discovered.

CONSTITUTION: An information reader/writer 76 is connected to a machine controller 80 through a read/write limiter 78 and outputs and input signals to and from a working information storage device 74 fitted to a truck to be worked in non-contacting state. The working information and various kinds of observed data read by the reader/writer 76 are transmitted to a working process information collecting computer 86 through an equipment communication network 83 and stored in the computer 86. Thus individual works are time sequentially observed at each observation point and stored together with information peculiar to the works. When abnormality is discovered, only the information related to the working state of the work in which a defect is found is retrieved and the retrieved information is reversely displayed from the abnormality discovering time. Therefore, the working process can be checked collectively.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the production process monitor approach and equipment for supervising the activity situation of each workpiece-ed in two or more production processes.
[0002]
[Description of the Prior Art] Not single Rhine but two or more Rhine is combined with a serial and juxtaposition, and the automated production process is the complicated process which the Rhine branches and joins further. At the production process automated and systematized by especially altitude, it cannot fully carry out only under the monitor by viewing of an operator. Therefore, the system of a production process, the cause investigation at the time of the abnormalities of a machine or poor quality generating, preventive maintenance, and upgrading are inadequate, and a prompt action cannot be taken. That is, there is little generating of abnormalities and missing by the thing in a complicated process which it generates when and where or prediction does not attach, generating an abnormal occurrence momentarily in many cases, etc. is also considered.
[0003] Then, VTR is installed, all or a part of routings are recorded on videotape, or the recorder which records an activity situation with a numeric value, a graph, etc. for every Rhine is formed, and it considers considering as the data as information for the cause investigation at the time of an abnormal occurrence etc. According to this, even if an operator does not always supervise, it can go back and an activity situation can be investigated.
[0004]
[Problem(s) to be Solved by the Invention] However, when installing VTR, it must be set as two or more parts of a long process activity, and a prolonged image transcription must be continued. For this reason, most video tapes become useless. Moreover, there is a trouble that it is very difficult for each workpiece-ed to pursue [considered / at which time / as the defective / it / how it is flowing or] the inside of a production process serially, and pursuit of the cause of a defect and correspondence take time amount.
[0005] when this invention bundle up the information for each workpiece-ed of every and display the processing condition in a routing which be different on the time series target of each workpiece-ed, a conveyance condition, and a processing result in consideration of the above-mentioned fact at the time of defect generating of back ** etc., it be the purpose to obtain the production process monitor approach and the equipment which can perform quickly the cause investigation and its correspondences at the time of defect generating etc.
[0006]
[Means for Solving the Problem] Invention according to claim 1 establishes two or more process activity stations in each in two or more production processes. Observe serially the information about the activity situation of each workpiece-ed, and such observation information is memorized with the proper information which specifies each workpiece-ed. When the abnormalities of a workpiece-ed or a final

product are discovered by the production process, it is characterized by what the observation information in each station of the production process of this workpiece-ed is retrieved out of said memorized observation information based on the proper information on a workpiece-ed, and is gone back and displayed from the time of abnormality discovery.
[0007] Invention according to claim 2 establishes plurality or a single station in each process in the production process which consists of a serial or juxtaposition, and a configuration that combined branching or unification with the list. Read the attribute information which starts the production if needed, including the proper information beforehand given to each workpiece-ed for each process of every at least, and it sets at all the stations within [all] a process. It picturizes and/or measures serially as each workpiece-ed of the passes through each station. Make such image information and measurement information equivalent to the proper information on said workpiece-ed each, and the attribute information which starts production if needed, and they are collected. Make it correspond with said proper information about all that were produced inside storage, or some workpieces-ed, and are recording storage is carried out. A' the time of defective generating discovery of back **, at the ti , of the abnormality discovery in a processing machine, at the time of the process diagnoses at the time of the abnormalities in a process etc., based on said proper information, retrieve said information by which storage are recording was carried out, indicate by playback, and each workpiece-ed is observed. It is characterized by performing cause investigation by observing a processing condition for the inside of a process serially, and/or observing the difference between workpieces-ed serially.
[0008] In said invention according to claim 2, since a defect workpiece is specified, paying attention to one or two or more observation items within a process, the time amount by which sequential production was carried out only in the item is gone back, it is made to display and, as for invention according to claim 3, defect generating etc. is characterized by playback and specifying a defect generating stage, a defect generating process, and a workpiece-ed [defect generating].
[0009] It is under [production process / which invention according to claim 4 becomes from a serial or juxtaposition, and the configuration that combined branching or an alternating current with the list] setting. Processing information is transmitted between conveyance fixtures for the flowing workpiece-ed and this workpiece-ed to convey the inside of a process. Or the means of processing signal transduction for transmitting the workpiece-ed proper information production attribute information that machine control equipment is transmitted from a production-control computer through a transmission network, While controlling an observation means to observe the processing condition of a workpiece-ed, a processing result, and conveyance information, and the machine actuation in each production process The process information gathering means which once carries out the storing storage of a machine control means to direct the stage of observation by said observation means, the proper information for each workpiece-ed of every which is flowing during the production process activity, the attribute information concerning production, and the observation information, The information had and transmitted is collected for every workpiece-ed, and the transmission network with which the information from said process information gathering computer for every process is transmitted is combined. The information storage means in which are recording storage is possible, Retrieval and the edit means of retrieving the information memorized by said information storage means, and performing edit for a display, It has a playback display means to display the compound-ized image information, the alphabetic character and the wave graphical representation means of displaying the alphabetic character which was combined with said playback display means and searched, a wave graph, etc., and an actuation means to perform actuation for said retrieval, and the retrieval and the display by the edit means.
[0010] invention according to claim 5 is characterized by for said means of processing signal transduction to come out with the processing information storage machine formed in the conveyance fixture for conveying the workpiece-ed which flows the inside of a routing, or this workpiece-ed, and the R/W machine for being prepared in each routing, and memorizing or reading processing information to said processing information storage machine, and to constitute it in invention according to claim 4.
[0011]

[Function] According to invention according to claim 1, the information about that activity situation is serially observed in a predetermined station, and each workpiece-ed is memorized with this workpiece-ed and the proper information to specify. Here, if the defect of this workpiece-ed is discovered, for example (at the time of abnormality discovery), only the information about the activity situation of the workpiece-ed which this defect generated from the memorized observation information will be retrieved, and it will be gone back and displayed from the time of this abnormal occurrence. For this reason, a different routing in time can be seen collectively and it can recognize easily what it became the situation which causes [of a defect] generating when in which work area.

[0012] According to invention according to claim 2, two or more Rhine is considered as a serial or juxtaposition, these Rhine branches and joins further, and it is hard to judge whether the components (a subassembly is included) of each workpiece-ed in Rhine of 1 are equivalent to the components of the workpiece-ed of the individual throat in other Rhine, or at which time it is combined only by glancing at a complicated production process. Moreover, in grasping an activity situation, any are desirable changes [image information the measurement information expressed by the alphabetic character, the graph, etc., or] with each routings.

[0013] Then, in all the stations within [all] a process, it picturizes and/or measures serially, and these are made to correspond to the proper information on each workpiece-ed, and are recording storage is collected and carried out as each workpiece-ed of the passes through each station.

[0014] Then, when there is defective generating etc., the activity situation of each part article combined with each workpiece-ed can be collectively observed by searching and indicating by playback based on proper information out of the information by which are recording storage was carried out. This observation can perform promptly cause investigation (a defect source location, stage, etc.) of defect generating.

[0015] According to invention according to claim 3, when the defect generating item is known, or when [even if it does not understand] advancing investigation paying attention to a specific item, it goes back and the time amount which chose this distinguished observation item or observed item within a process, and was produced is indicated by playback over a workpiece-ed. It can see by this how the activity situation has changed this observation item over all workpieces-ed, or whether it is normal collectively, and a defect generating stage and a workpiece-ed [defect generating] can be specified, and the activity situation at that time can be known.

[0016] According to invention according to claim 4, processing information is memorized with the means of processing signal transduction to the workpiece-ed or conveyance fixture which flows the inside of a process. With an observation means, the processing condition of a workpiece-ed, a processing result, conveyance information, etc. are made equivalent to said processing information, and are observed. Storing storage is once carried out by the process information gathering means, and this observation information transmits the observation information within all processes to the information storage means which carries out package management through a transmission network.

[0017] If the actuation for retrieval and a display is made by the actuation means here, only specific information will be selected out of the information memorized by the information storage means, and the compound-ized image will be expressed for a playback display means and an alphabetic character, and a graphical representation means as retrieval / edit means. Thus, package management of the observation information within each process is carried out, only what was searched is put in block, since it can indicate by compound, the work flow of a certain specific workpiece-ed can be collectively seen from the start to the end, and only a certain specific observation item can also be seen collectively.

[0018] According to invention according to claim 5, as a means of processing signal transduction, a processing information storage machine is formed in a workpiece-ed or a conveyance fixture, processing information is memorized from an R/W machine to this processing information storage machine, and it has composition read with an R/W vessel.

[0019] For this reason, what process each part article of each workpiece-ed is flowing when can specify easily.

[0020]

[Example] The whole tire automatic molding Rhine 10 configuration is shown in drawing 1 .
[0021] This tire automatic molding Rhine 10 is the configuration that it is classified into band molding Rhine 12, raw case molding Rhine 14, BT (belt top tread) band molding Rhine 16, and raw tire molding Rhine 18, the assembly finally attached by each Rhine joins, and the raw tire 20 is cast.
[0022] In band molding Rhine 12 Three processes of the 2nd ply pasting section 26 of a process which sticks I/L and CH pasting section 22 of a process which sticks an inner liner (I/L) chafer (CH), the 1st ply pasting section 24 of the process which sticks the 1st ply, and the 2nd ply are installed as a serial process activity. Between each process, when the truck 28 (henceforth the 1st truck 28) with a band drum moves from a position in readiness, each process activity is made one by one, and it is sent out to the bead set section 30.
[0023] In the bead set section 30, the bead supplied from the bead feed zone 32 is standing by, and a bead is set to the band subassembly after the 2nd ply was stuck by the 2nd ply pasting section 26 through the band conveyance ring 36. Molding of a band assembly is completed with the set of this bead.
[0024] In the bead set section 30, the conveyance ring 36 of the band conveyance section 34 is moved to the end of the movable range, and it is standing by, and while a bead fixes to a band assembly with this conveyance ring 36, a band assembly receives from the 1st truck 28, and is passed. As for the 1st truck 28 which delivered the band assembly, the circumference is repeated to a position in readiness return and henceforth (refer to arrow-head [of drawing 1] A). In addition, a total of five sets are going the 1st truck 28 around.
[0025] The conveyance ring 36 is conveyed to raw case molding Rhine 14, where a band assembly is held.
[0026] In raw case molding Rhine 14, the clinch section 38, the side (tread ST) pasting section 40, and the raw case fetch section 42 are installed as a serial process activity, and between each process, when the truck 44 (henceforth the 2nd truck 44) with a clinch drum moves, a process activity is made one by one and it is sent out to a raw case conveyance process.
[0027] The 2nd truck 44 is standing by in the other end location of the movable range of said conveyance ring 36, and from the conveyance ring 36 holding a band assembly, a band assembly receives it and it is passed.
[0028] The 2nd truck 44 holding a band assembly After being turned up with a ring 39 by return in the clinch section 38, sticking a side tread in ST (side tread) pasting section 40 subsequently, and completing molding of a raw case assembly, This raw case assembly is delivered to the conveyance container 46 in the raw case conveyance section (refer to arrow-head [of drawing 1] B), and the circumference which returns to the other end location of the movable range of said conveyance ring 36 is repeated (refer to arrow-head C of drawing 1). In addition, a total of three sets are going the 2nd truck 44 around.
[0029] The conveyance container 46 which received the raw case assembly from the 2nd truck 44 is conveyed to raw tire molding Rhine 18, and stands by in the about 48 stitching section of this raw tire molding Rhine 18.
[0030] On the other hand, BT band assembly cast by BT band molding Rhine 16 is sent into this raw tire molding Rhine 18, and a raw case assembly and BT band assembly join it. That is, raw case molding Rhine 14 and BT band molding Rhine 16 are juxtaposition joint Rhine.
[0031] In BT band molding Rhine 16, the 1st belt pasting section 50, the 2nd belt pasting section 52, the LAY (layer belt) / CAP (cap belt) pasting section 54, and TT (top tread) pasting section 56 are installed as a serial process activity. Between each process, when the truck 58 (henceforth the 3rd truck 58) with a belt top pasting drum moves, a process activity is made one by one and it is sent out to said raw tire molding Rhine 18.
[0032] After the process of TT pasting section 56 is completed and molding of BT band assembly is completed, the 3rd truck 58 is moved to the end of the movable range of BT band conveyance container 60, BT band assembly is delivered to this BT band conveyance container 60, and the circumference is repeated henceforth (refer to arrow-head D of drawing 1 R> 1). In addition, a total of six sets are going the 3rd truck 58 around.

[0033] BT band conveyance container 60 is moved to the other end of the movable range, where BT band assembly is held. At this time, from the raw case conveyance container 46, a raw case assembly wins popularity to the stitching section 48, and is passed to it, and BT band assembly and a raw case assembly already join in this stitching section 48. In this stitching section 48, by making the combination of BT band assembly and a raw case assembly, stitching processing and RR measurement of a raw tire, and LR measurement, molding of the raw tire 20 is completed, and the raw tire 20 is received and passed to the raw tire conveyance container (illustration abbreviation) which is standing by at raw tire stitching section 48 edge, and is conveyed by this conveyance container to a tester 62 (drawing Nakaya mark E).
[0034] In a tester 62, the raw tire 20 once secedes from a conveyance container, and is laid to examining-table 62A, weight deflection is measured, and it is held again after that at a raw tire conveyance container, and is hooked on hook 64A of the raw tire truck 64.
[0035] If the raw tire 20 is hooked on hook 64A of the raw tire truck 64, a conveyance container will carry out return standby to the delivery location of stitching section 48 edge.
[0036] In RR and LR measurement in the raw tire stitching section 48, and weight deflection measurement of the raw tire 20 in a tester 62, it is judged that the raw tire 20 made out of range proper is poor, and although processed as a defect tire, without being sent to the raw tire truck 64, it is necessary to pursue this cause of a defect for defect generating prevention of future production.
[0037] So, in this example, a station is established in each process of each Rhine, and the condition until one raw tire 20 carries out the completion of molding is observed serially. Hereafter, the configuration of the station installed in each part of each Rhine is explained to a detail.
[0038] [Band molding Rhine 12] As shown in drawing 2 , in band molding Rhine 12, with the rail which is not illustrated, the drive transfer section 68 for drums is attached on the base 66, and, as for the 1st truck 28 which moves between each process, the drum 72 is supported to revolve through the shaft 70 from this retaining wall 68.
[0039] If in position [of each 1st truck 28] is carried in and carried out to each part material pasting process, it is connected with the drive attached in each process fixed side by coupling, and can be in the condition which can be drum driven.
[0040] The processing information storage machine 74 is attached in the side face of the base 66, and the 1st truck 28 corresponds to it with the information R/W machine 76 in the condition of standing by in the position in readiness. It connects with machine control equipment 80 through the R/W controller 78, and an output and an input of a signal (for example, microwave, light) are possible for this information R/W machine 76 non-contact. The R/W controller 78 is controlled by machine control equipment 80.
[0041] As shown in drawing 3 , while machine control equipment 80 is connected to the branch line transmission network 82 in tire automatic molding Rhine 10 of this example and R/W control is directed through this branch line transmission network 82, sequential control of the activity in I/L and C / H pasting section 22 is performed.
[0042] Here, if truck No., production code No., and lot No. are specified with machine control equipment 80 when the 1st truck 28 arrives at a position in readiness, the signal (henceforth processing information) according to this truck No., production code No., lot No., and code No. of a raw tire proper will be outputted from the R/W machine 76, and the processing information storage machine 74 will memorize.
[0043] As shown in drawing 1 , in I/L and CH pasting section 22 The optical sensor which I/L **** and detects the width method and the amount of pin center,large gaps at the time (point of measurement A1), The image-processing mold measuring instrument which detects the width method and the amount of pin center,large gaps of I/L on the automatic pasting equipment for sending in I/L on the drum 72 of said 1st truck 28 (point of measurement A2), While detecting the width method and the amount of pin center,large gaps of I/L on said drum 72 The image pick-up machine (point-of-measurement A4, A6) which picturizes the static image of the knot of right and left CH while picturizing the static image of the knot (knot after winding 1 round) of I/L on the image-processing mold measuring instrument (point-of-

measurement A3, A5) which detects the set location of right and left CH, and said drum 72 is arranged. It considers as the station, respectively. At the time of measurement in these stations, or an image pick-up, the processing information memorized by the processing information storage machine 74 of said 1st truck 28 is read with the R/W vessel 76. In addition, the device communication network 83 connects and each observation means is directly linked with the process information gathering computer 86 mentioned later.

[0044] As shown in drawing 3 , each observation means and the process information gathering computer 86 receive measurement or control of an image pick-up, and control of the information gathering to a computer through the DIO (digital input output) interface 84 with machine control equipment 80. Moreover, through the branch line transmission network 82 and the device communication network 83, the processing information read with this R/W vessel 76 and each observation (measurement or image pick-up) data are transmitted to the process information gathering computer 86, and processing information and each observation data are matched and they are memorized, respectively.

[0045] Here, each image pick-up machine inputs a static image, it carries out a temporary storage to the image memory in an image pick-up machine after analog-to-digital conversion, and it performs data compression processing in consideration of the effectiveness of data transfer, and a rate further. In addition, I/L detected by the optical sensor (point of measurement A1) ****, the data of six points in an one tire (1 round) part become 1 set, and the width method at the time and the data of the amount of pin center,large gaps are transmitted.

[0046] It connects with said branch line transmission network 82, and the process information gathering computer 86 is connected to the basic high-speed transmission network 90 used as the communication link transmission network of predetermined area (for example, works whole) through the transmission network connector 88.

[0047] As shown in drawing 4 , such a control data collection system 92 (connection condition to the branch line transmission network 82) within a process is the same also in other processes (the 1st ply pasting section 24 and the 2nd ply pasting section 26) (the whole is hereafter called control data collection system 94 in Rhine).

[0048] Here, the stations and observation means in band molding Rhine 12 are enumerated. In addition, the sign in Table 1 supports the station in drawing 1 .

[0049]

[Table 1]

観測工程	観測点	観測手段	符号
I／L	巻出時の幅、センターずれ	光学式センサ	A 1
I／L	自動貼付装置上の幅、センターずれ	画像処理型測定器	A 2
I／L	ドラム上の幅、センターずれ	画像処理型測定器	A 3
I／L	ドラム上の繋ぎ目状態	撮像器	A 4
CH	ドラム上の左右CHのセット位置	画像処理型測定器	A 5
CH	ドラム上の左右CHの繋ぎ目状態	撮像器	A 6
第1プライ	巻出時の幅、センターずれ	光学式センサ	A 7
第1プライ	自動貼付装置上の幅、センターずれ	画像処理型測定器	A 8
第1プライ	ドラム上の幅、センターずれ	画像処理型測定器	A 9
第1プライ	ドラム上の繋ぎ目状態	撮像器	A10
第2プライ	巻出時の幅、センターずれ	光学式センサ	A11
第2プライ	自動貼付装置上の幅、センターずれ	画像処理型測定器	A12
第2プライ	ドラム上の幅、センターずれ	画像処理型測定器	A13
第2プライ	ドラム上の繋ぎ目状態	撮像器	A14
ビードセット	バンド上のビードセット状態	撮像器	A15

[0050] [Raw case molding Rhine 14] the 2nd truck 44 which moves with the rail which is not illustrated in raw case molding Rhine 14 between each process Consider as the configuration similarly only by the 1st above-mentioned truck 28 differing from the drum structure for pasting, and the 2nd truck 44 in the condition of standing by in the other end location of the movable range of the conveyance ring 36 of the band conveyance section 34 The processing information storage machine 74 formed in the side face corresponds with the information R/W machine 76.

[0051] Here, the same processing information as the processing information written in the 2nd truck 44 in said 1st truck 28 at the time of delivery of a band assembly is memorized by the processing information storage machine 74 from the information R/W machine 76 with machine control equipment.

[0052] Since it is the same configuration as the control system 94 in Rhine of said band molding Rhine 12, the control data collection system 96 in Rhine in raw case molding Rhine 14 omits detailed explanation.

[0053] Below, the station and observation means of each process in raw case molding Rhine 14 are shown. In addition, the sign in Table 2 supports the station in drawing 1 .

[0054]

[Table 2]

観測工程	観測点	観測手段	符号
折り返し	ドラム上の折り返し高さ	画像処理型測定器	B 1
ST	ドラム上の左右STのセット位置	画像処理型測定器	B 2
ST	ドラム上の左右STの繋ぎ目状態	撮像器	B 3

[0055] [BT band molding Rhine 16] the 3rd truck 58 which moves with the rail which is not illustrated in BT band molding Rhine 16 between each process It considers as the same configuration as the 1st

above-mentioned truck 28 only by the drum structures for pasting differing, and the processing information storage machine 74 corresponds with the information R/W machine 76 in the condition that the 3rd truck 58 is standing by in the end location of the movable range of BT band conveyance container 60.
[0056] Here, the same processing information as the processing information written in the 2nd truck 44 with which the raw case assembly combined with BT band assembly which appears in this 3rd truck 58 was laid in the 3rd truck 58 is memorized by the processing information storage machine 74 from the information R/W machine 76 with machine control equipment.
[0057] Since it is the same configuration as the control system 94 in Rhine of said band molding Rhine 12, the control data collection system 98 in Rhine in BT band mold Rhine 16 omits detailed explanation.

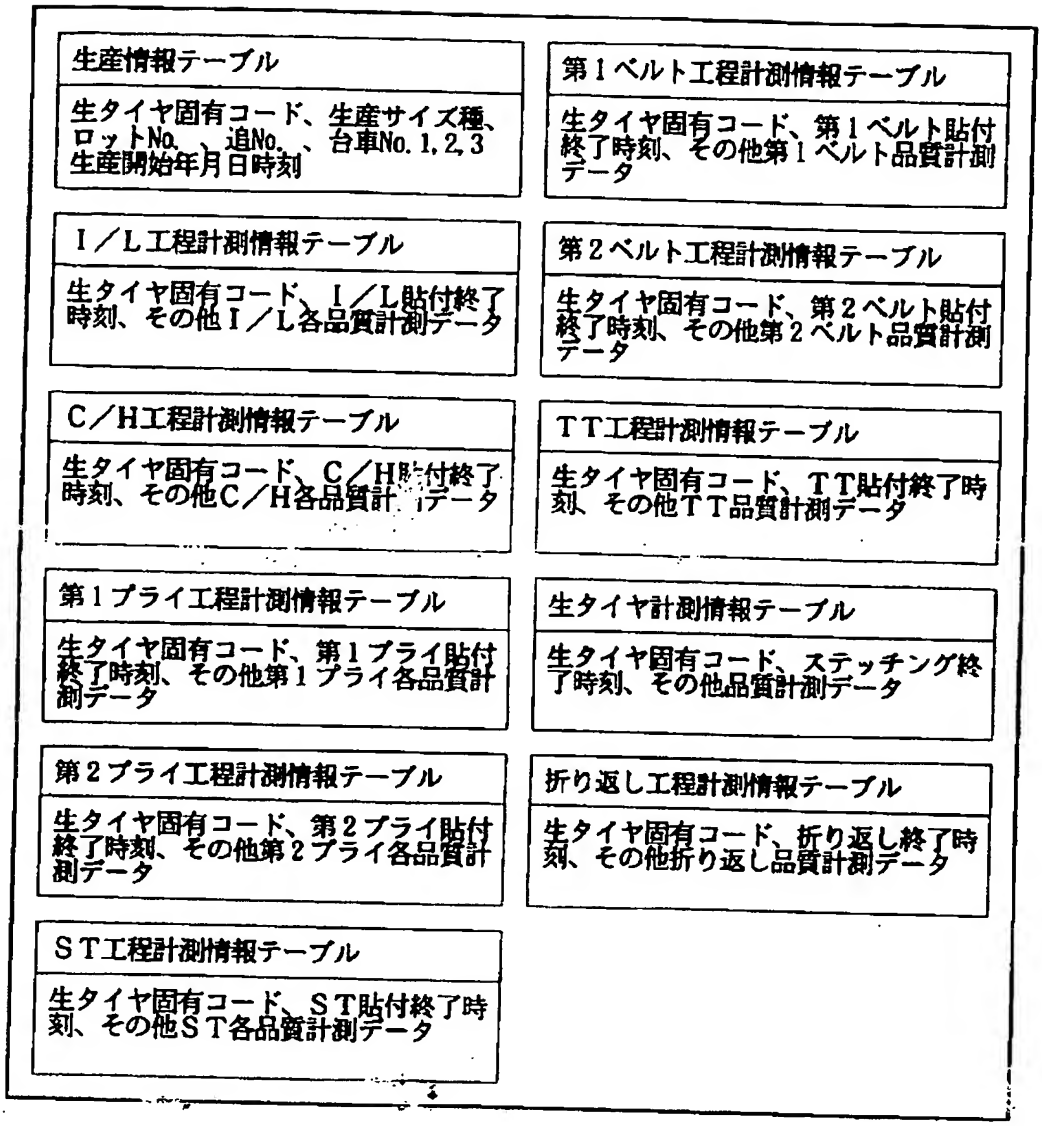
[0058] Below, the station and observation means of each process in BT band molding Rhine 16 are shown. In addition, the sign in Table 3 supports the station in drawing 1 .
[0059]
[Table 3]

観測工程	観測点	観測手段	符号
第1ベルト	巻出時の幅、センターずれ	光学式センサ	C 1
第1ベルト	自動貼付装置上の幅、センターずれ	画像処理型測定器	C 2
第1ベルト	ドラム上の幅、センターずれ	画像処理型測定器	C 3
第1ベルト	ドラム上の繋ぎ目状態	撮像器	C 4
第2ベルト	巻出時の幅、センターずれ	光学式センサ	C 5
第2ベルト	自動貼付装置上の幅、センターずれ	画像処理型測定器	C 6
第2ベルト	ドラム上の幅、センターずれ	画像処理型測定器	C 7
第2ベルト	ドラム上の繋ぎ目状態	撮像器	C 8
LAY/CAP	ドラム上の貼付状態	撮像器	C 9
TT	ドラム上の幅、センターずれ	画像処理型測定器	C10
TT	ドラム上の繋ぎ目状態	撮像器	C11

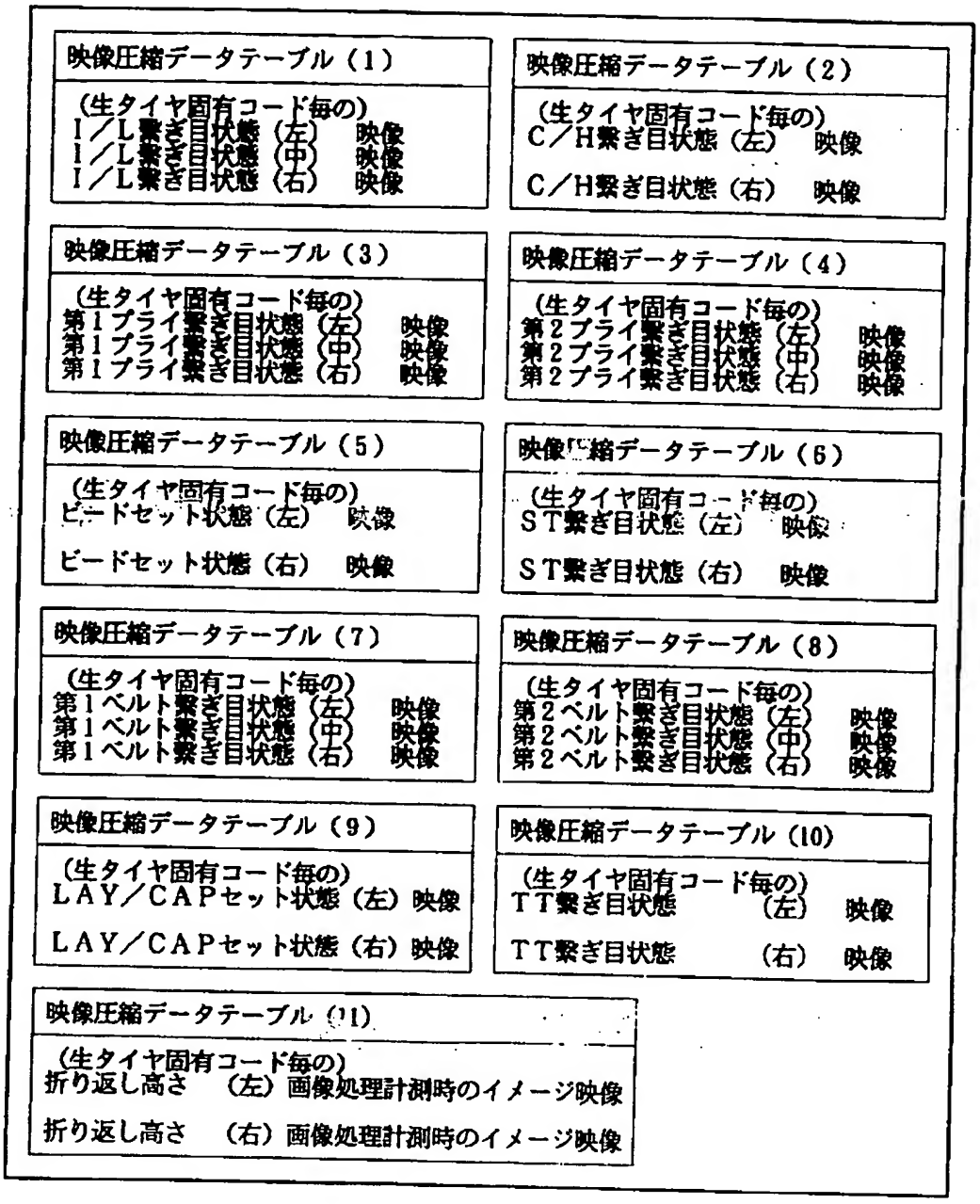
[0060] [Raw tire molding Rhine 18] Where a raw case assembly and BT band assembly are combined (the completion condition of molding of the raw tire 20), measurement of LR (lateral runout) and RR (radial runout) of the raw tire 20 is performed, and, subsequently the weight deflection of the raw tire 20 is measured in a measuring instrument 62 by the stitching section 48 in raw tire molding Rhine 18.
[0061] Since it is the same configuration as the control system 94 in Rhine of said band molding Rhine 12, the control data collection system 100 in Rhine in raw tire molding Rhine 18 omits detailed explanation.
[0062] The station and observation means of each process in raw tire molding Rhine 18 are shown below. In addition, the sign in Table 4 supports the station in drawing 1 .
[0063]
[Table 4]

観測工程	観測点	観測手段	符号
ステッチング	生タイヤのＬＲ	画像処理型測定器	Ｄ１
ステッチング	生タイヤのＲＲ	レーザ型変位測定器	Ｄ２
計量器	生タイヤの重量	ロードセル型重量計	Ｄ３

[0064] As shown in drawing 4 , the branch line transmission network 82 is connected to the central transmission network 104 of the central-control section 102 which performs all managements of predetermined area through the transmission network connector 106 at the basic high-speed transmission network 90 connected by the transmission network connector 88.
[0065] The information storage computer 108 is connected to the central transmission network 104, and the measurement (image pick-up) data sent from said each control data collection systems 94, 96, and 98,100 in Rhine are inputted into it.
[0066] By this information storage computer 108, it has the duty which dissociates and is comparatively remembered to be little measurement data and the image pick-up data with comparatively much amount of information by which compression processing was carried out of amount of information in the enternal memory vessels 110 and 112, respectively.
[0067] The block diagram for a classification of data within the information storage computer 108 is shown in drawing 5 . The information storage computer 108 was equipped with the transmission network communications department 122, and has incorporated data from the central transmission network 104 by this transmission network communications department 122. The transmission network communications department 122 is connected to the track record receive section 124, and data have the track record receive buffer 126 once stored by this track record receive section 124.
[0068] This stored data is classified and edited into measurement data and image data by the database transducer 128 for every same processing information, it is stored in the measurement data buffer 130 and the image data buffer 132, respectively, and measurement data are memorized by the data base manager 134 after that the enternal memory machine with which image data consist of optical disks etc. to the enternal memory machine 110 which consists of magnetic disks etc., and 112, respectively.
[0069] In addition, it is shown in Table 5 and 6 -- as -- the enternal memory machine 110 and each data in 112 -- all -- a raw tire proper code -- containing -- a table -- it-izing and memorizes and, for this reason, each data can be matched easily.
[0070] Here, Table 5 is production / measurement database, and Table 6 is an image database.
[0071]
[Table 5]


生産情報テーブル
生タイヤ固有コード、生産サイズ種、ロットNo.、追No.、台車No.1,2,3生産開始年月日時刻
第１ベルト工程計測情報テーブル
生タイヤ固有コード、第１ベルト貼付終了時刻、その他第１ベルト品質計測データ
Ｉ／Ｌ工程計測情報テーブル
生タイヤ固有コード、Ｉ／Ｌ貼付終了時刻、その他Ｉ／Ｌ各品質計測データ
第２ベルト工程計測情報テーブル
生タイヤ固有コード、第２ベルト貼付終了時刻、その他第２ベルト品質計測データ
Ｃ／Ｈ工程計測情報テーブル
生タイヤ固有コード、Ｃ／Ｈ貼付終了時刻、その他Ｃ／Ｈ各品質計測データ
ＴＴ工程計測情報テーブル
生タイヤ固有コード、ＴＴ貼付終了時刻、その他ＴＴ品質計測データ
第１プライ工程計測情報テーブル
生タイヤ固有コード、第１プライ貼付終了時刻、その他第１プライ各品質計測データ
生タイヤ計測情報テーブル
生タイヤ固有コード、ステッチング終了時刻、その他品質計測データ
第２プライ工程計測情報テーブル
生タイヤ固有コード、第２プライ貼付終了時刻、その他第２プライ各品質計測データ
折り返し工程計測情報テーブル
生タイヤ固有コード、折り返し終了時刻、その他折り返し品質計測データ
ＳＴ工程計測情報テーブル
生タイヤ固有コード、ＳＴ貼付終了時刻、その他ＳＴ各品質計測データ

[0072]
[Table 6]



[0073] Moreover, edit / retrieval computer 114 is connected to the central transmission network 104. by this edit / retrieval computer 114, an operator operates the actuation machine 116 -- things -- **** -- the data directed are searched from the enternal memory machines 110 and 112 through said information gathering computer 108, and it outputs to an alphabetic character, the graphical representation machine 118, and the compound image reproduction drop 120.

[0074] Since two or more processes until one raw tire is cast are matched using processing information, each activity which has a gap in time (time series differs) can be put in block, presenting of production information with an alphabetic character and the graphical representation machine 118 and measurement information and the display of the image data based on the compound graphic display machine 120 can be interlocked, and it can be made to display by this example here. It can follow, for example, a raw tire can check easily which activity of which process has been unsuitable forward.

[0075] That is, as shown in drawing 6 , a total of 12 window screens 121A-121L (refer to drawing 7) project on the monitor 121 of the compound graphic display machine 120 with the production information on the raw tire by switch by actuation of the actuation machine 116.

[0076] Window screen 121A is in the observation condition of I/L and the C/H pasting section 22, and is divided into the following 5 blocks. The image of the knot condition on the right-hand side of I/L projects [the image of the knot condition of the center of C/H, and A-5] on A-1 block to the image of the knot condition on the left-hand side of C/H, and A-2 blocks at the image of the knot condition on the right-hand side of C/H, and A-3 blocks the image of the knot condition on the left-hand side of I/L, and A-4, respectively.

[0077] Window screen 121B is in the observation condition of the 1st ply pasting section 24 and the 2nd ply pasting section 26, and is divided into the following 6 blocks. To the image of the knot condition on the left-hand side of the 1st ply, and B-2 blocks, at B-1 block The image of the knot condition of the center of the 1st ply **, To the image of the knot condition on the right-hand side of the 1st ply, and B-4 blocks, at B-3 blocks The image of the knot condition on the left-hand side of the 2nd ply, The image of the knot condition on the right-hand side of the 2nd ply projects on the image of the knot condition of the center of the 2nd ply **, and B-6 blocks at B-5 blocks, respectively.

[0078] Window screen 121C is in the observation condition of the bead [illegible] section 30, and by this example, since it consists of images of right-and-left each three beads, it is divided into the following 6 blocks. To the image of the set condition of the 1st measure point of a left bead, and C-2 blocks, at C-1 block The image of the set condition of the 2nd measure point of a left bead, To the image of the set condition of the 3rd measure point of a left bead, and C-4 blocks, at C-3 blocks The image of the set condition of the 1st measure point of a right bead, The image of the set condition of the 3rd measure point of a right bead projects on the image of the set condition of the 2nd measure point of a right bead, and C-6 blocks at C-5 blocks, respectively.

[0079] Window screen 121D thru/or window screen 121G are in the observation condition of the clinch section 38, and are divided into the following 4 blocks, respectively. To the image image based on the measurement result of the clinch height of the left-hand side in the 1st measure point, and D-2 blocks, at D-1 block The image image based on the measurement result of the clinch height of the right-hand side in the 1st measure point, The image image based on the measurement result of the clinch height of the right-hand side in the 2nd measure point projects on the image image based on the measurement result of the clinch height of the left-hand side in the 2nd measure point, and D-4 blocks at D-3 blocks, respectively.

[0080] To the image image based on the measurement result of the clinch height of the left-hand side in the 3rd measure point, and E-2 blocks, at E-1 block The image image based on the measurement result of the clinch height of the right-hand side in the 3rd measure point, The image image based on the measurement result of the clinch height of the right-hand side in the 4th measure point projects on the image image based on the measurement result of the clinch height of the left-hand side in the 4th measure point, and E-4 blocks at E-3 blocks, respectively.

[0081] For a F-1 block, at the image image based on the measurement result of the clinch height of the left-hand side in the 5th measure point, and F-2 blocks The image image based on the measurement result of the clinch height of the right-hand side in the 5th measure point, The image image based on the measurement result of the clinch height of the right-hand side in the 6th measure point projects on the image image based on the measurement result of the clinch height of the left-hand side in the 6th measure point, and F-4 blocks at F-3 blocks, respectively.

[0082] To the image image based on the measurement result of the clinch height of the left-hand side in the 7th measure point, and G-2 blocks, at G-1 block The image image based on the measurement result of the clinch height of the right-hand side in the 7th measure point, The image image based on the measurement result of the clinch height of the right-hand side in the 8th measure point projects on the image image based on the measurement result of the clinch height of the left-hand side in the 8th measure point, and G-4 blocks at G-3 blocks, respectively.

[0083] Window screen 121H are in the observation condition of ST pasting section 40, and are divided into the following 2 blocks. The image of the knot condition on the right-hand side of ST projects on the image of the knot condition on the left-hand side of ST (side tread), and H-2 blocks at H-1 block, respectively.

[0084] Window screen 121I is in the observation condition of the 1st belt pasting section 50, and is divided into the following 3 blocks. The image of the knot condition on the right-hand side of the 1st belt projects on the image of the knot condition of the center of the 1st belt, and I-3 blocks at I-1 block at the image of the knot condition on the left-hand side of the 1st belt, and I-2 blocks, respectively.
[0085] Window screen 121J are in the observation condition of the 2nd belt pasting section 52, and are divided into the following 3 blocks. The image of the knot condition on the right-hand side of the 2nd belt projects on the image of the knot condition of the center of the 2nd belt, and J-3 blocks at J-1 block at the image of the knot condition on the left-hand side of the 2nd belt, and J-2 blocks, respectively.
[0086] Window screen 121K are in the observation condition of the LAY/CAP pasting section 54, and are divided into the following 2 blocks. The image of the set condition on the right-hand side of LAY/CAP projects on the image of the set condition on the left-hand side of LAY/CAP, and K-2 blocks at K-1 block, respectively.
[0087] Window screen 121L is in the observation condition of TT pasting section 56, and is divided into the following 2 blocks. The image of the knot condition on the right-hand side of TT projects on the image of the knot condition on the left-hand side of TT (top tread), and L-2 blocks at L-1 block, respectively.
[0088] Although the proper code of these images to project of a workpiece-ed (raw tire) corresponds, they are conditions, differ in pasting working hours and have composition projected for every pasting sequence for molding of the same raw tire 20. that is, paying attention to every [each] workpiece-ed (raw tire), it is a screen configuration in the case of observing a processing condition serially, this precedes being displayed, and the inside of a process is depended on retrieval and the edit computer 114 -- it is edited beforehand. Of course, when going back and, displaying the time amount produced one by one only in the item for example, paying attention to one or two or more observation items within a process, production information and a measurement information display can be interlocked with, and only the item can also be displayed that the serial change in the station becomes another screen configuration considered to be intelligible.
[0089] An operation of this example is explained below. First, the routing of tire automatic molding Rhine 10 is explained.
[0090] In the position in readiness of the 1st truck 28, if industrial-processing information is memorized by the processing information storage machine 74, it will move to I/L and the C/H pasting section 22, and will stick in order of I/L and C/H. I/L is drawn out by **** equipment from an I/L ingredient involvement truck, and, specifically, is twisted around the peripheral surface of the drum 72 of the 1st truck 28 by equipment with a volume through an accumulator. It is similarly carried out about C/H.
[0091] Termination of an activity in this I/L and C/H pasting section 22 moves the 1st truck 28 to the 1st ply pasting section 24. At this time, the 1st next truck 28 moves to I/L and the C/H pasting section 22.
[0092] In the 1st ply pasting section 24, the 1st ply is stuck, subsequently, the 1st truck 28 moves to the 2nd ply pasting section 26, and the 2nd ply is stuck. Then, the 1st truck 28 carries out sequential migration, and is moved in the direction of the arrow head A of drawing 1 to the bead set section 30.
[0093] It is set to the band assembly which the bead with a filler was conveyed, it was held at the conveyance ring 36, and transit and the pasting activity to the 2nd ply on the 1st truck 28 ended from the bead feed zone 32 to the bead set section 30. The set band assembly is received and passed to the conveyance ring 36, and the 1st truck 28 returns to a position in readiness after that. Thus, five sets of the 1st trucks 28 go around the loop formation shown by the arrow head A of drawing 1 , and a band assembly is cast one by one.
[0094] the condition in which the conveyance ring 36 held the band assembly when the bead was set -- it is -- the end of the movable range of the band conveyance section 34 to the other end -- it moves.
[0095] In the other end location of the band conveyance section 34, the 2nd truck 44 of raw case molding Rhine 14 is standing by, and a band assembly is received and passed in it to the drum 72 of this 2nd truck 44 from the conveyance ring 36.
[0096] The arrow head C of drawing 1 meets and it moves, and first, both ends are turned up with a ring 39 by return in the clinch section 38, subsequently, a side tread is stuck on ST pasting section 40

migration and there, and the 2nd truck 44 which received the band assembly moves to the raw case fetch section 42.

[0097] A raw case assembly is received and passed to the conveyance container 46 in this raw case fetch section 42. The 2nd truck 44 which delivered the raw case assembly returns to the other end location of the movable range of the conveyance ring 36 of the band conveyance section 34. Thus, three sets of the 2nd trucks 44 go around the loop formation shown by the arrow head C of drawing 1 , and a raw case assembly is cast one by one.

[0098] The conveyance container 46 is conveyed along with the arrow head B of drawing 1 , and is moved to the stitching section 48 of raw tire molding Rhine 18.

[0099] Here, in parallel to operation of band molding Rhine 12 and raw case molding Rhine 14, BT band molding Rhine 16 is also working, and BT band assembly cast in this BT band molding Rhine 16 is conveyed to the stitching section 48, joins said raw tire assembly, and is combined.

[0100] In BT band molding Rhine 16, the 3rd truck 58 moves to the 1st belt pasting section 50 first, and the 1st belt is stuck. Then, sequential migration is carried out to the 2nd belt pasting section 52, the LAY/CAP pasting section 54, and TT pasting section 56, the 2nd belt, LAY/CAP, and a top tread are stuck, and the 3rd truck 58 moves to the end of the successive range of BT band conveyance container 60. From the 3rd truck 58, BT band assembly wins popularity to BT band conveyance container 60, and is passed to it in this location.

[0101] The 3rd truck 58 which delivered BT band assembly moves along with the arrow head D of drawing 1 , and moves to this side of the 1st belt pasting section 50. Thus, six sets of the 3rd trucks 58 go around the loop formation shown by the arrow head D of drawing 1 , and BT band assembly is cast one by one.

[0102] BT band assembly held at BT band conveyance container 60 reaches to the stitching section 48, when this BT band conveyance container 60 moves to the other end of a successive range. In the stitching section 48, like the above-mentioned, the raw case assembly is standing by, this raw case assembly and BT band assembly are put together, stitching processing is made, and, finally molding of the raw tire 20 is completed after RR inspection and LR inspection.

[0103] The raw tire 20 is again held by conveyance container 46, even the weight tester 62 is conveyed, it is once laid in examining-table 62A, and weight deflection is measured. By conveyance container 46, the raw tire 20 which passed is conveyed to the raw tire truck 64, is hooked on hook 64A by this measurement, and is stocked. If the raw tire 20 of the specified quantity is hooked on hook 64A, it will be moved the whole raw tire truck 64, and will be sent into the vulcanization furnace which is a back process.

[0104] Although the raw tire 20 made into the rejection in RR inspection in said stitching section 48, LR inspection, or the weight tester 62 although the above was the routing of whole raw tire automatic molding Rhine 10 will naturally be canceled or reused, it needs to perform recurrence prevention by studying the cause made into the rejection.

[0105] So, in this example, two or more activity stations can be established in each Rhine and each process, the contents of observation can be memorized with production information, such as code No. of a raw tire proper, and the activity situation of each station can be grasped from code No. of the proper of the raw tire 20 used as a rejection.

[0106] Below, it explains taking the case of the observation procedure in the station in I/L and the C/H pasting section 22 of band molding Rhine 12.

[0107] [The observation at the time of I/L pasting and data collection procedure] If the 1st truck 28 reaches I/L and the C/H pasting section 22, machine control equipment 80 will read the production information memorized by the processing information storage machine 74 fixed to the side face of the base 66 of the 1st truck 28 with the information R/W vessel 76.

[0108] In advance of pasting of I/L, I/L is ****(ed) by **** equipment, and before transporting to automatic pasting equipment, the sheet width method and its amount of center gaps of I/L are measured with a measuring instrument (point of measurement A1). Timing to measure is made into six per 1 round of drums, and the timing is because an indication signal is outputted to a measuring instrument

through a DIO interface by machine control equipment. And 6 sets of measurement data is stored in the memory in a measuring instrument.
[0109] The measurement data stored in this measuring instrument (point of measurement A1) is transmitted to the process information gathering computer 86 of a through lever in the device communication network 83 through the DIO interface 84 based on the measurement data incorporation indication signal to the process information gathering computer 86.
[0110] Next, as for I/L moved to automatic pasting equipment, the amount of pin center,large gaps and width method for the conveyance direction medial axis are again measured by the measuring instrument (point of measurement A2) on a conveyor. In automatic pasting equipment, this is a thing which has serious effect for I/L pasting quality and to perform for accumulating, if this changes. The technique indicated by JP,3-194406,B is applicable to this measurement.
[0111] This measurement is also made into six per 1 round of drums, and measurement timing is directed from machine control equipment like the above-mentioned, and measurement data is transmitted to the process information gathering computer 86 by directions of machine control equipment like the above-mentioned.
[0112] Next, as for I/L stuck on the peripheral surface of the drum 72 of the 1st truck 28 by automatic pasting equipment, the amount of pin center,large gaps and a width method are measured by the measuring instrument (point-of-measurement A3). This is measurement which has serious effect for I/L pasting quality and which is performed for accumulating, if these change on a drum 72.
[0113] The measured data are transmitted to the process information gathering computer 86 like the above-mentioned.
[0114] the drum 72 of I/L -- after sticking and ending, a pasting knot condition is observed with an image pick-up vessel (point-of-measurement A4). At this time, angle of rotation of a drum 72 is positioned with machine control equipment so that a knot may come to the transverse plane of an image pick-up machine (point-of-measurement A4). If positioning is completed, machine control equipment will output the A/D conversion of a video signal, and the signal of a compression command to an image pick-up machine (point-of-measurement A4) to an image pick-up machine (point-of-measurement A4).
[0115] Thereby, each video signal of the three cross direction of the knot of I/L is stored in the condition of it having been digitized by the memory in an image pick-up machine (point-of-measurement A4), and having been compressed into it, and is transmitted to the process information gathering computer 86 like the above-mentioned after that.
[0116] [The observation at the time of C/H pasting and data collection procedure] After pasting of I/L and observation, and data collection are completed, machine control equipment 80 performs attachment of C/H. In order to carry out a measuring instrument and an image pick-up machine (point-of-measurement A3, A4) to C/H set location measurement in advance of pasting of this C/H, a location is moved and it positions to the location which functions as a measuring instrument (point-of-measurement A5, A6).
[0117] With this measuring instrument and an image pick-up vessel (point-of-measurement A5, A6), the set condition of C/H of drum right and left should be measured like the time of I/L pasting, and rank second. The knot condition of C/H on either side is photoed. These data are also transmitted to the process information gathering computer 86.
[0118] Thus, if all observation in I/L, and the C / H pasting section 22 and measurement data are sent to the process information gathering computer 86, measurement data will be transmitted to the information storage computer 108 through the branch line transmission network 82, the transmission network connector 88, the basic high-speed transmission network 90, the transmission network connector 106, and the central transmission network 104 for every one pasting activity.
[0119] Such observation and measurement data are transmitted to the information storage computer 108 for every one activity at each Rhine and each process. In addition, a parameter and a measurement means are indicated to Table 1 thru/or 4, and each explanation here is omitted.
[0120] Next, an information storage computer performs the communication link with the information gathering computer for each processes by the transmission network communications department, and

serially, through this transmission network communications department 122, the measurement data transmitted from the process information gathering computer 86 of each process is passed to the track record receive section 124, and is once stored in a buffer 126. This buffer 126 has sufficient capacity to store all the information transmitted from each process for 20 raw tires which exist in all Rhine then.
[0121] The information stored in the buffer 126 is divided into production, measurement information (refer to Table 5), and image information (refer to Table 6), is edited into every same production code and lot No. by the database transducer, is changed into the format which is further easy to process to database creation, and is stored in the measurement data buffer 130 and the image data buffer 132, respectively. Then, distribution storing of these data is done by the data base manager 134 to the enternal memory machines 110 and 112.
[0122] Thus, since each data was matched with processing information, such as code No. of a raw tire proper, and was made to memorize, the required activity situation in the production process of the raw tire 20 can be read easily, and each process activity shifted in time can be collectively seen with an alphabetic character, the graphical representation machine 118, or the compound image reproduction drop 120. For example, in the compound image reproduction drop 120, by setting up the window screen of 12 beforehand and reading the widow screen of a required process, each process activity of one raw tire from which time series differs can be put in order and seen, and cause investigation from which the raw tire 20 became a rejection becomes easy.
[0123] In addition, in this example, although the window screen change method was adopted, it is also possible by using the thing of high resolution for the display of a playback drop to increase the image frame number of a coincidence display and to reduce the number of window screens.
[0124] Or it is also possible to use two or more drops, and to reduce a window change, or to lose.
[0125] In addition, not only raw tire automatic molding Rhine 10 explained by this example but two or more Rhine can join a serial or juxtaposition, or the production process monitor approach of this invention can be applied to other Rhine where there are two or more unification and branching, and the time amount of the process activity of one finished product differs.
[0126]
[Effect of the Invention] the production process monitor approach and the equipment which apply to this invention as explain above have the outstanding effectiveness that the cause investigation and its correspondences at the time of defect generating etc. can perform quickly, by put in block the information for each workpiece-ed of every, and display the processing condition in a routing which be different on the time series target of each workpiece-ed, a conveyance condition, and a processing result at the time of defect generating of back ** etc.

[Translation done.]